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Planning for Future Sea Level Rise in the South San Francisco Bay Shoreline Study

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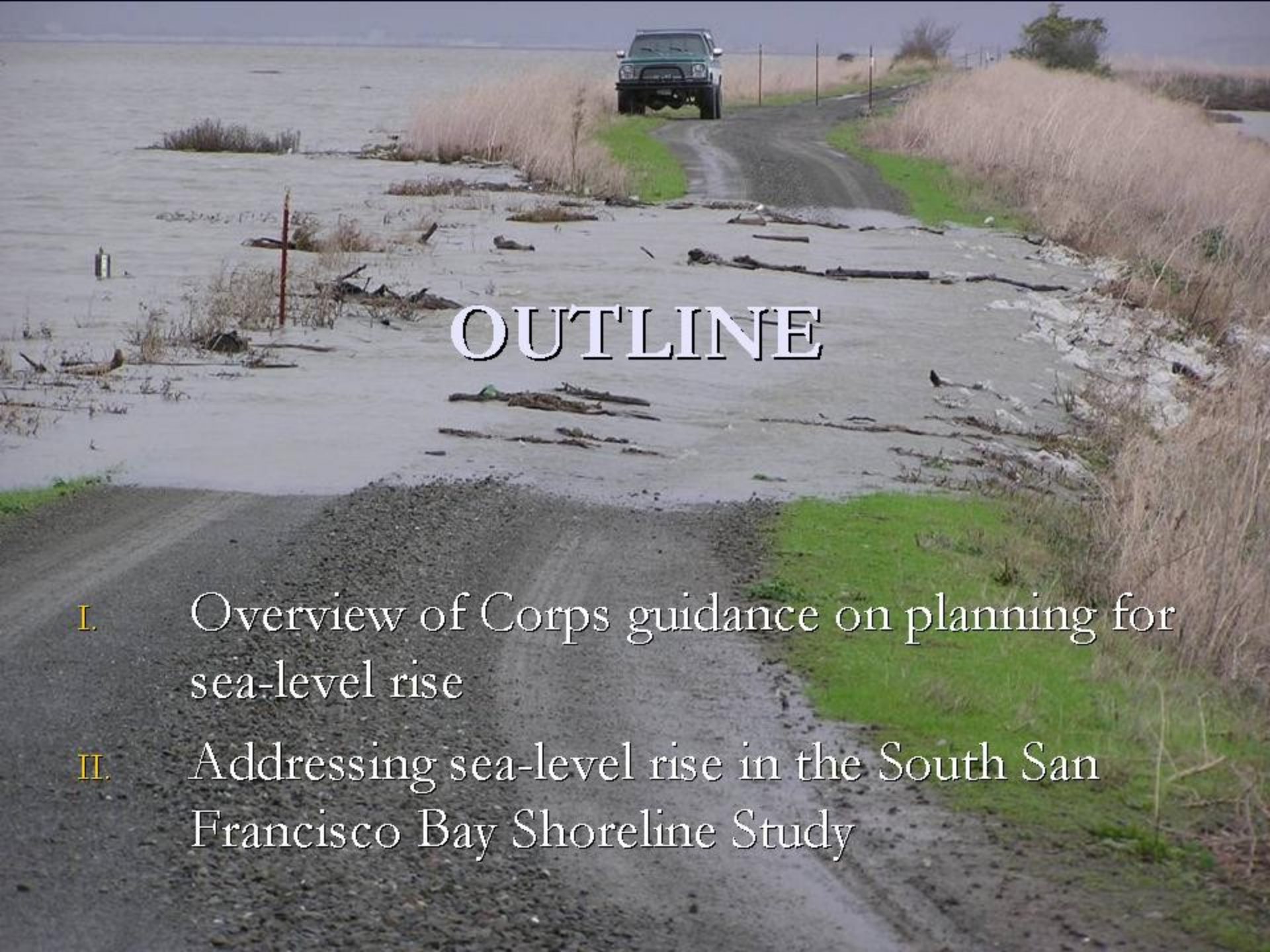
South San Francisco Bay, 1980s



OUTLINE

I. Overview of Corps guidance on planning for sea-level rise

II. Addressing sea-level rise in the South San Francisco Bay Shoreline Study

2007 USACE Climate Change Strategies White Paper

- "The water resources public works being planned today must be robust and resilient to future extreme events and designed with an added degree of uncertainty in their re-occurrence frequency and/or magnitude due to global warming. The inventory of infrastructure that we manage today must likewise be maintained and, perhaps, upgraded to provide an extra degree of safety, resiliency and reliability to address these uncertainties."

Evolution of Corps Policy

- 1986 - Plan using local historical data with extrapolation

- 2000 - Address the risk and uncertainty associated with both historically determined and future estimates for rates of sea-level rise

Planning Guidance Notebook

- Potential relative sea level change should be considered in every coastal and estuarine (as far inland as the new head of tide) feasibility study that the Corps undertakes.

- A sensitivity analysis should be conducted to determine what effect (if any) changes in sea level would have on plan evaluation and selection.

- The analysis should be based, as a minimum, on the extrapolation of the local, historical record of relative sea level rise as the low level and Curve 3 from the NRC report as the high level.

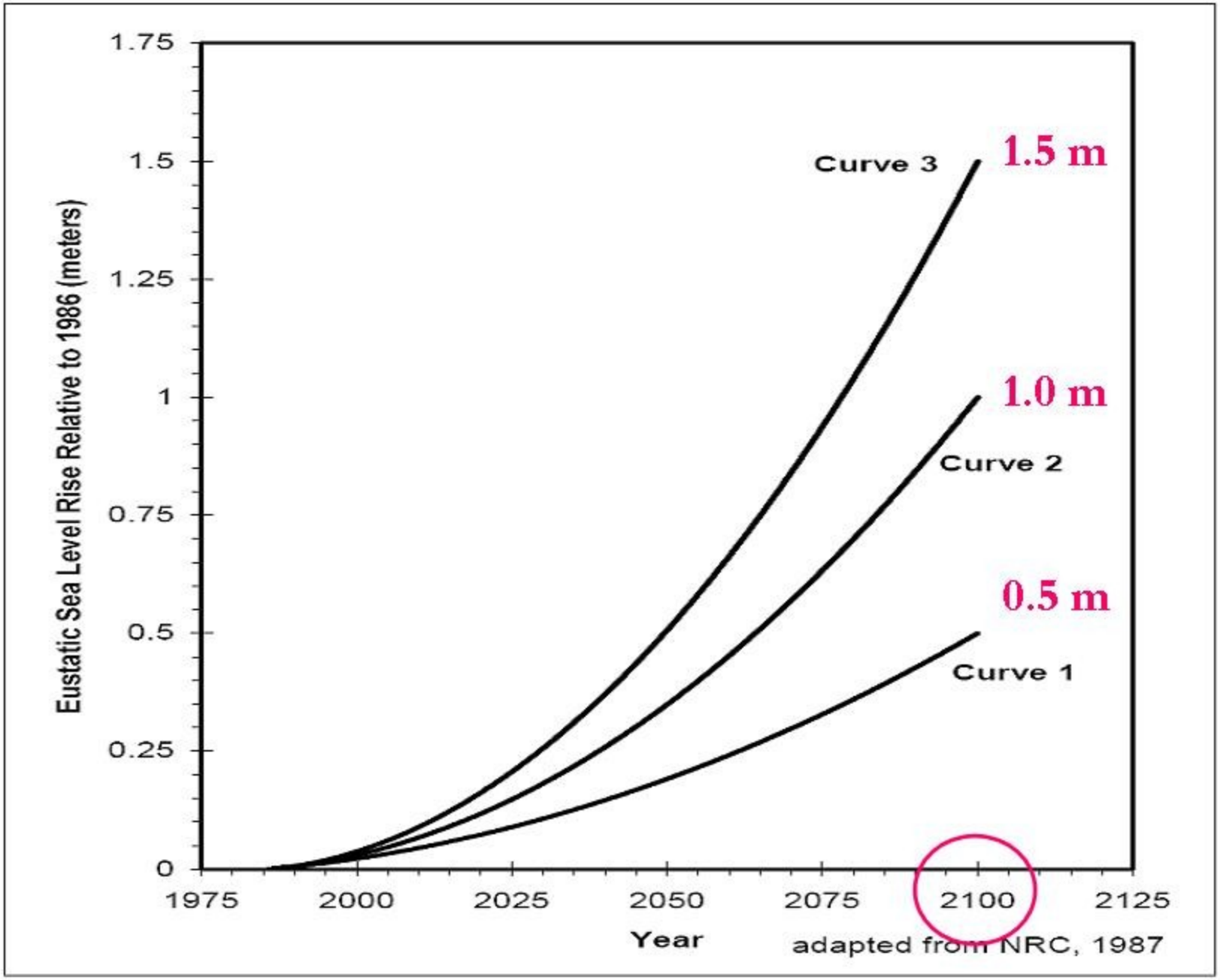


Figure 1. National Research Council Scenarios for Eustatic Sea Level Rise

Planning Guidance Notebook

- If the plan selection is sensitive to sea level rise, then design considerations could allow for future modification when the impacts of future sea level rise can be confirmed [adaptive management].

- Feasibility studies should consider which designs are most appropriate for a range of possible future rates of rise.

- Designs that would be appropriate for the entire range of uncertainty should receive preference over those that would be optimal for a particular rate of rise but unsuccessful for other possible outcomes.

What's Appropriate?

- *Recommended plan should be "appropriate for the entire range of uncertainty"*
  - NOT an alternative that will have significant 'with project' or 'residual' damages during its economic life

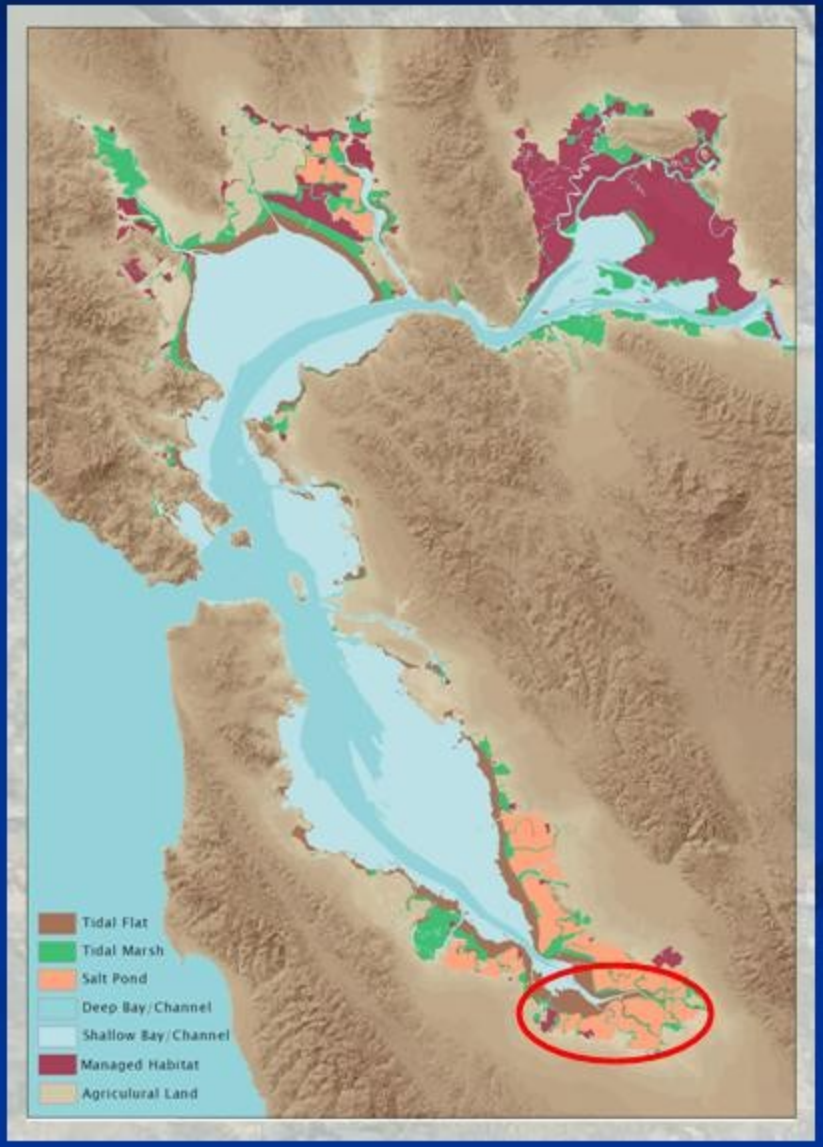
South SF Bay Shoreline Study and Sea-Level Rise

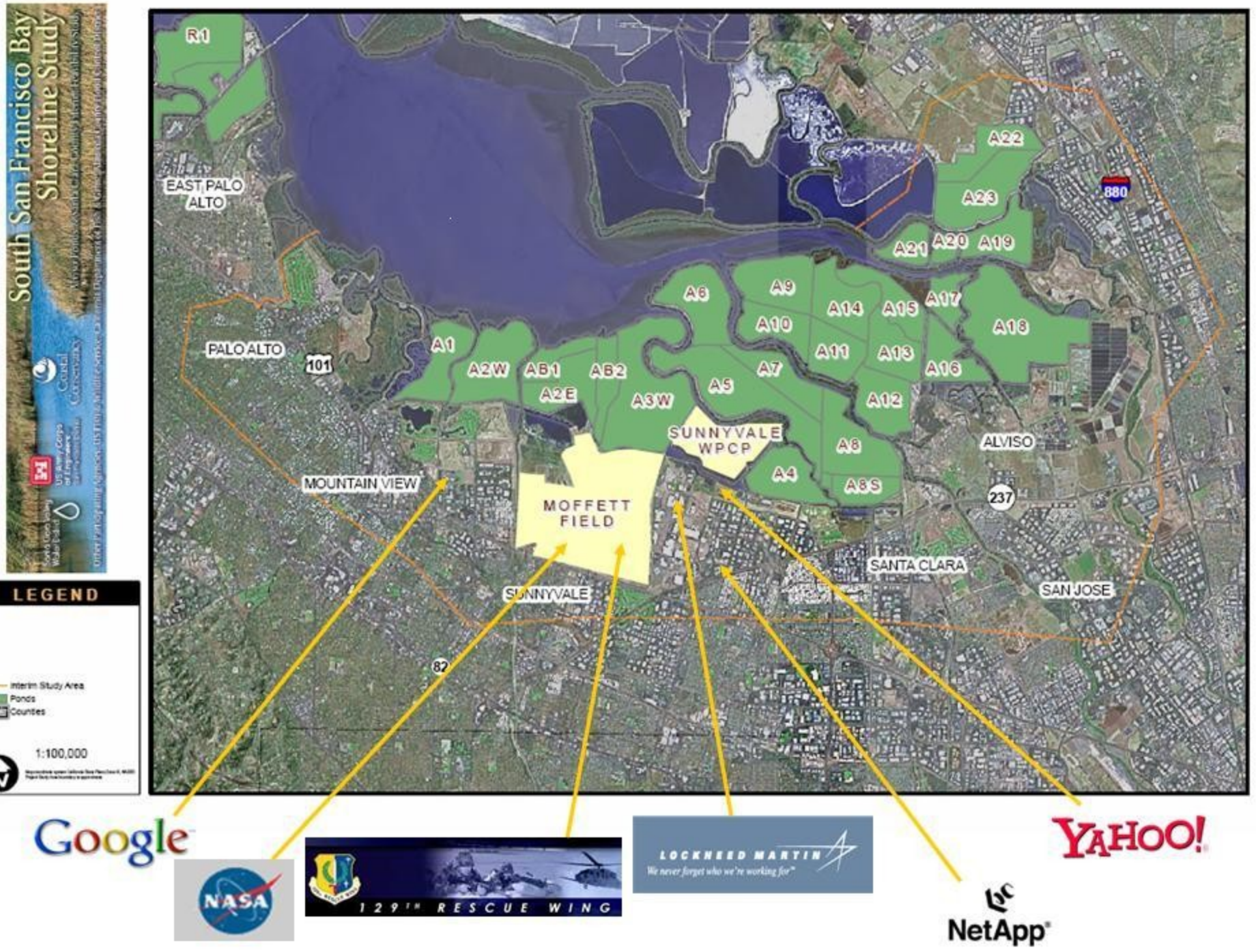
Shoreline Study Overview

- Multipurpose project
  - Flood-risk management
  - Ecosystem Restoration

Study Area

- ~8,000 acres former salt-production ponds adjacent to Silicon Valley
- USFWS and local land ownership
- ~15 miles of shoreline
- Historic subsidence
  - parts of study area are up to 4 feet below sea level
- Significant commercial and public facilities present




South San Francisco Bay Shoreline Study
LEGEND
Interim Study Area
Ponds
Counties
1:100,000
R1
EAST PALO ALTO
PALO ALTO
101
MOUNTAIN VIEW
MOFFETT FIELD
SUNNYVALE
SUNNYVALE WPCP
ALVISO
SANTA CLARA
SAN JOSE
237
880
82
A1
A2W
AB1
AB2
A2E
A3W
A5
A6
A7
A8
A8S
A4
A9
A10
A11
A12
A13
A14
A15
A16
A17
A18
A19
A20
A21
A22
A23
Google
NASA
129TH RESCUE WING
LOCKHEED MARTIN
We never forget who we're working for™
NetApp
YAHOO!

Shoreline Study

- …is an estuarine study undertaken by the Corps and will therefore consider the effects of sea-level rise during planning

Shoreline Study

- …will assume three sea-level rise rates:
  - Local historical (low)
  - Curve 1, NRC (mid & similar to IPCC 2007)
  - Curve 3, NRC (high & similar to recent conservative projections)

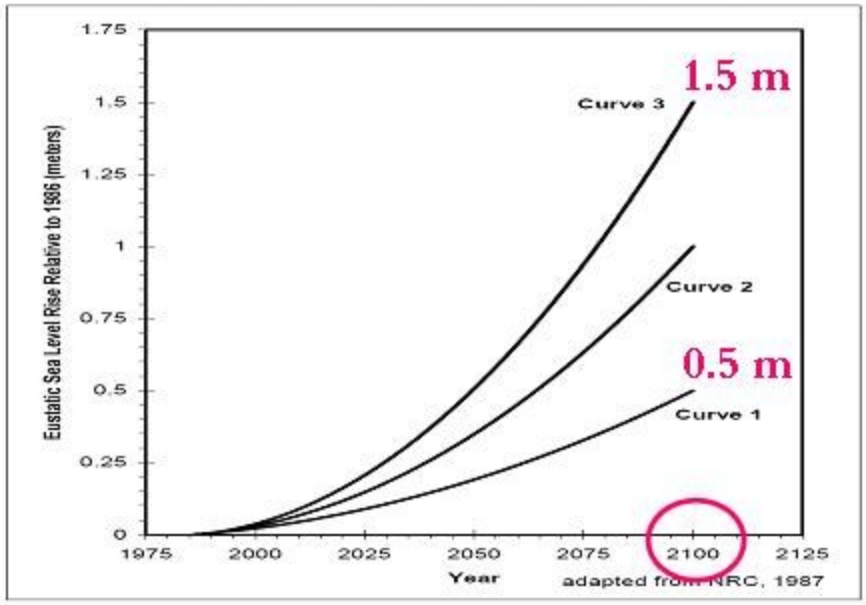
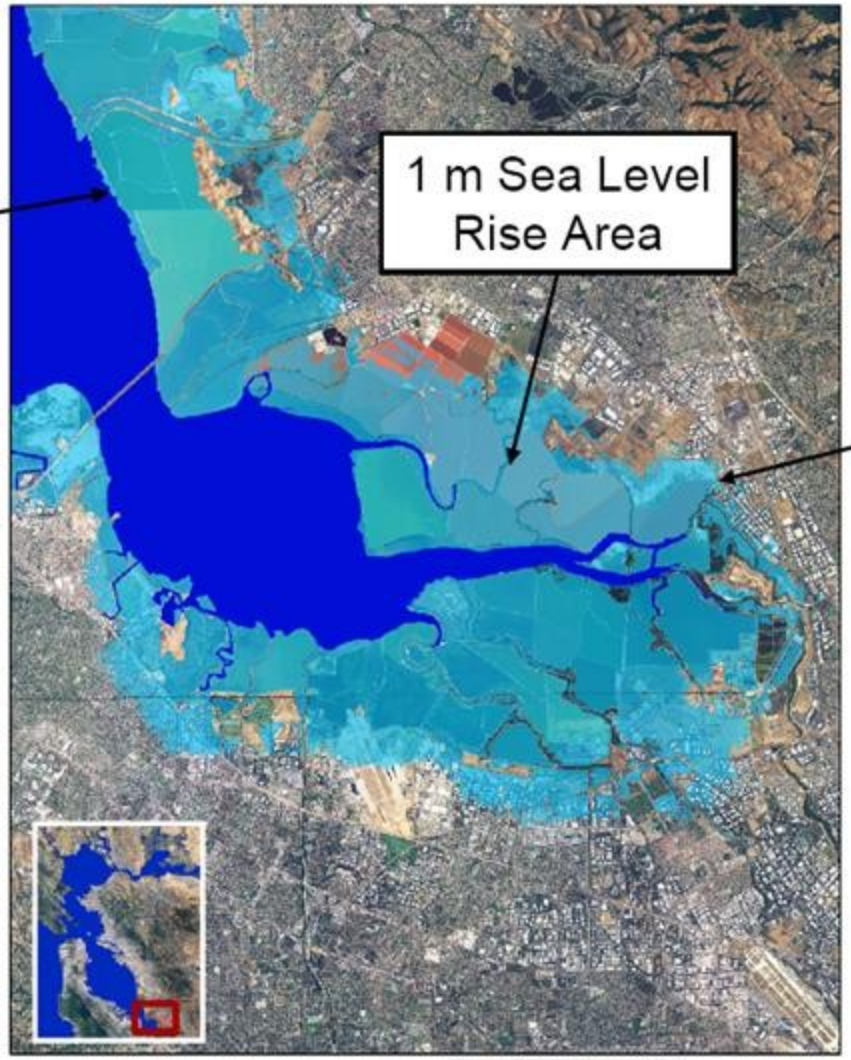


Figure 1. National Research Council Scenarios for Eustatic Sea Level Rise

San Francisco Bay Scenarios for Sea Level Rise
South Bay


Current Shoreline
1 m Sea Level Rise Area
Future Shoreline?
Miles
0 0.5 1 2 3
N
San Francisco Bay
1 m sea level rise
bcdc
Map is based on USGS 2m DSM and National Agriculture Imagery Program data. Map is illustrative and depicts a potential inundation scenario in 2100. Limitations in the geospatial data available may effect accuracy. Map should not be used for planning purposes.

Shoreline Study

- …will utilize the following planning strategies:
  - Adaptive management.
  - Facilitating future modifications.
  - Design for the future

Potential Levee Approaches

- Adaptive management
  - Modify levees after initial construction, after sea level rise is better understood
- Facilitating future modifications
  - Greater levee width to accommodate future raising
  - Reserve land on inboard side of levee
- Design for the future
  - Greater levee heights during initial construction

Shoreline Study

- …will perform risk and sensitivity analyses to quantify the benefits and costs of design alternatives.

Upcoming milestones

- Year 0 and Year 50 flood mapping – Summer/Fall 2008
- Preliminary Alternatives – Fall/Winter 2008/9
- Feasibility Scoping Meeting – Spring/Summer 2009
- Planning CoP Conference – 2010

Questions?